SOFT COMPUTING
(ELECTIVE I)

Course Code: 15IT2106
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     3   0   3

Course Outcomes:
At the end of the course, a student should be able to
CO1: Explain soft computing techniques, artificial intelligence systems.
CO2: Differentiate ANN and human brain.
CO3: Analyse perceptron learning algorithms.
CO4: Compare fuzzy and crisp logic systems.
CO5: Discuss genetic algorithms.

UNIT –I   (10-Lectures)
Soft Computing: Introduction of soft computing, soft computing vs. hard computing, various types of soft computing techniques, applications of soft computing.
Artificial Intelligence: Introduction, Various types of production systems, characteristics of production systems, breadth first search, depth first search techniques, other Search Techniques like hill Climbing, Best first Search, A* algorithm, AO* Algorithms and various types of control strategies. Knowledge representation issues, Prepositional and predicate logic, monotonic and non monotonic reasoning, forward Reasoning, backward reasoning, Weak & Strong Slot & filler structures, NLP.

UNIT –II   (10-Lectures)
Neural Network: Structure and Function of a single neuron: Biological neuron, artificial neuron, definition of ANN, Taxonomy of neural net, Difference b/w ANN and human brain, characteristic and applications of ANN, single layer network.
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UNIT – III   (10-Lectures)
Perceptron: Perceptron training algorithm, Linear separability, Widrow & Hebb's learning rule/Delta rule, ADALINE, MADALINE, AI v/s ANN. Introduction of MLP, different activation functions, Error back propagation algorithm, derivation of BBPA, momentum, limitation, characteristics and application of EBPA.
Counter propagation network: architecture, functioning & characteristics of counter Propagation network, Hop field/ Recurrent network, configuration, stability constraints, associative memory, and characteristics, limitations and applications. Hopfield v/s Boltzman machine. Adaptive Resonance Theory: Architecture, classifications, Implementation and training. Associative Memory.

UNIT – IV   (10-Lectures)
Fuzzy Logic: Fuzzy set theory, Fuzzy set versus crisp set, Crisp relation & fuzzy relations, Fuzzy systems: crisp logic, fuzzy logic, introduction & features of membership functions.
Fuzzy rule base system: Fuzzy propositions, formation, decomposition & aggregation of fuzzy Rules, fuzzy reasoning, fuzzy inference systems, fuzzy decision making & Applications of fuzzy logic.

UNIT – V   (10-Lectures)
Genetic algorithm: Fundamental, basic concepts, working principle, encoding, fitness function, reproduction, Genetic modeling: Inheritance operator, cross over, inversion & deletion, mutation operator, Bitwise operator ,Generational Cycle, Convergence of GA, Applications & advances in GA, Differences & similarities between GA & other traditional methods.

TEXT BOOKS:
1. S.N. Sivanandam & S.N. Deepa: Principles of Soft Computing, Wiley Publications, 2nd Edition, 2011.
2. S, Rajasekaran & G.A. Vijayalakshmi Pai: Neural Networks, Fuzzy Logic & Genetic Algorithms, Synthesis & applications, PHI Publication, 1st Edition, 2009.

REFERENCES:
1. N.K.Bose, Ping Liang: Neural Network fundamental with Graph, Algorithms & Applications, TMH, 1st Edition, 1998.
2. Bart Kosko: Neural Network & Fuzzy System, PHI Publication, 1st Edition, 2009.
3. Rich E, Knight K: Artificial Intelligence, TMH, 3rd Edition, 2012.
4. George J Klir, Bo Yuan: Fuzzy sets & Fuzzy Logic: Theory & Applications, PHI Publication, 1st Edition, 2009.
5. Martin T Hagen: Neural Network Design, Nelson Candad, 2nd Edition, 2008.

WEB REFERENCES:
www.myreaders.info/html/soft_computing.html